LEUCITE. — Professor H. Rosenbusch[1] of Heidelberg, has recently made the most interesting observation that the morphological no less than the optical characters of the mineral leucite can be brought into full accord with the regular system by a sufficient increase of temperature. It is well known that this mineral was regarded as the very type of an isometric icosatetrahedron until vom Rath showed that considerable variation from the calculated angles as well as frequent twinning lamellæ parallel the face $_{\infty}O$ necessitated the assumption of a tetragonal symmetry. The double refraction of this substance was also a point in favor of this view. The recent studies of Klein, Merian and Penfield have, however, shown that above a certain temperature leucite, like boracite, becomes altogether isotropic and now Rosenbusch finds that by the same means the twinning lamellæ, ordinarily visible as a system of fine striations, may likewise be made to disappear. A crystal upon which these were unusually distinct was brought in focus under the microscope by reflected light in such a manner that the main face appeared bright while the lamellæ were in the shadow. Heat was now gradually applied and the most remarkable effect observed. A kind of undulatory motion was noticed and whole groups of lamellæ would disappear at one point and reappear at another, until finally, at the requisite temperature, all were gone and the face was seen to be quite uniform and even. Upon cooling the lamellæ returned but in a different position from that which the original ones occupied. So great was the molecular disturbance here produced, that after some repetitions of the experiment on the same crystal it fell to pieces. The supposition is made that leucite crystallizes in the regular system at high temperatures, and in some other unknown system at ordinary temperatures. The effort of the molecules to suit their arrangement to the altered conditions produces a tension which finds relief in the formation of secondary twinning lamellæ parallel to the slipping plane ("gleitfläche"), which in this case is $_{\infty}O$. When the temperature is raised this tension is of course removed. The attempt will be made by the same investigator to measure a crystal of leucite on a reflection goniometer at the temperature necessary for the obliteration of the twinning lamellæ, when it is expected that the interfacial angles will agree perfectly with the regular symmetry.

BOTANY.[2]

THE ABUNDANCE OF ASH RUST.—In Eastern Nebraska, this year has been remarkable for the great abundance of the ash rust (*Æcidium fraxini*) upon the leaves, petioles and twigs of the green ash. In many instances each leaflet contained from ten to

[1] Neues Jahrbuch für Min., etc., 1885. II, p. 1.

[2] Edited by PROFESSOR CHARLES E. BESSEY, Lincoln, Nebraska.

twenty of the characteristic spots, varying from a tenth to a quarter of an inch in diameter. The petioles and partial petioles were frequently greatly distorted and enlarged, and in many cases the young twigs were swollen out into rounded nut-like growths which were covered with the tubular Æcidia.

The injury produced by this rust in Lincoln was quite considerable, as green ash trees have been very largely planted along the streets for shade and ornament. These planted trees appear to have suffered more than the native ones along the streams, although the latter were by no means free from the parasite.

I have as yet been unable to obtain any clue to the further development of the ash rust. One would look for a correspondingly great growth of red and black rust upon some of the plants of this region, but so far I have not observed any indication that such is the case.—*Charles E. Bessey.*

THE FERTILIZATION OF THE WILD BEAN (*Phaseolus diversifolius*).—The flowers (Fig. 1) of the wild bean when fresh are of a pretty rose-purple color, turning to a sort of dirty flesh color in fading. This change of color occurs at a time when insect visits are no longer necessary to the flower and no doubt serves to inform the insect that it has no food to offer. The two wings are free from the keel but lie close to it; they furnish an *alighting* place

Fig. 1.

Fig. 3.

Fig. 2.

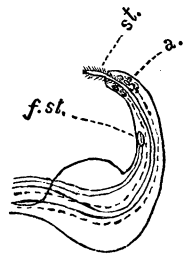

Fig. 5.

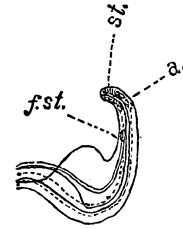

Fig. 4.

FIG.—Flower of wild bean, seen somewhat from below. FIG. 2.—Keel and wings. FIG. 3.—Keel alone, showing lens-shaped base. FIG. 4.—Enlarged section of keel with style enclosed. FIG. 5.—The same with style projecting; *st*, stigma; *f. st*, free stamen; *a*, anthers of connected stamens. The dotted lines indicate the course of the united filaments.

for the middle-sized bees which visit it (Fig. 2). The keel itself has the form of a vertically placed lens at its base, narrowing above into a narrow tube, which encloses both stamens and styles (Fig. 3). The anthers lie about the hairy end of the style and shed their pollen upon it. After this has escaped the free ends of the filaments shrivel up and allow the somewhat freer movement of the style. The anthers never leave the keel. Nine of the stamens are united by their filaments, but the tenth is free. In

their natural state both stamens and style are included by the keel and lie along the lower portion of the dilated part of the keel (Fig. 4).

When a bee visits the flower it alights upon the wings on the left side of the keel. In its struggles to get at the honey, it pushes down the wings, these carry with them the keel, and their combined motion forces out the hairy end of the style, while the peculiar curvature of the keel directs its stigma to the side and back of the bee (Figs. 5 and 1). In this act the stamens and style are in reality passive. They lie at first along the bottom of the keel, the depression of the keel pulls it away from the stamens and draws its tube down from the style, the small opening at its end forbidding the extrusion of the stamens. The pollen collected on the hairs of the style is left on the back of the bee and the stigma receives fresh pollen from some other flower which had been left on the back of the insect during some previous visit. As soon as the bee leaves the flower the parts again resume their normal position. The mechanism of the flower is similar to that of *Ph. vulgaris*, but lacks the double spiral of the keel.—*Aug. F. Foerste, Granville, Ohio.*

The Movement of Protoplasm in the Styles of Indian Corn.—It will not be too late when this appears in print for students in botanical laboratories to study the movement of the protoplasm in the long styles ("silks") of the Indian corn. By taking a young style from an ear which has been kept in a warm place for an hour or so, clipping off a piece a couple of inches in length and carefully mounting it in water under a large cover-glass, there will be no difficulty in seeing a great deal of activity in the protoplasm. Care must of course be taken to have the style lie flat, remembering that it is not cylindrical in shape, but somewhat ribbon-shaped. The cells are much elongated and the walls are so transparent that with careful focusing their contents may be seen, even in the interior parts of the style.

The protoplasm is sufficiently granular to be easily seen. It moves along the side of the cell in a strong steady stream, occasionally heaping up a great mass, which is eventually pushed onward by the current. As an easily obtained and instructive example of protoplasmic activity I know of nothing which is superior to such a specimen.—*Charles E. Bessey.*

Bacteria as Vegetable Parasites.—The only genuine instance of parasitic bacteria in plants yet mentioned in the books (De Bary, Zopf, etc.) is that of the yellow sickness of hyacinths, first described by Dr. Wakker, of Amsterdam, in 1882. This bacterium winters in the bulb scales, and increases in the spring to slimy yellow masses which destroy the tissues and eventually kill the plant. The priority of demonstrating parasitic bacteria in plants belongs, however, to an American. In 1880, two years

before Dr. Wakker's announcement of bacteria in hyacinths, Professor T. J. Burrill, of Illinois, presented a paper before the American Association for the Advancement of Science demonstrating the invariable presence of characteristic bacteria in the disease known as "pear blight," which attacks pomaceous trees, and that the disease may be transmitted from tree to tree by inoculation. Since then the bacteria have been isolated and cultivated in artificial media, and the statements of the original paper fully confirmed. Americans should have credit for what little original work they do accomplish in bacteriology.—*J. C. Arthur, in Botanical Gazette.*

WORK FOR THE BOTANICAL CLUB OF THE A. A. A. S.—This organization, with its large yearly attendance, may well undertake some work which has been long neglected in this country. We do not forget that the principal object of its founders was to bring the botanists together for social purposes, and are rejoiced to know that in this respect it has accomplished much. Many of the lonely botanists living in remote parts of the country have been gladdened and encouraged by meeting their fellows and consulting upon means and methods. This result is in itself a justification of the existence of the club.

But this should not be all. At every annual meeting some progress should be made in the effort to bring about concerted action among the botanists of the country with regard to many matters. We will venture to suggest here some things which might well occupy a part of the time of the club.

1. In view of the rapid increase in what may be termed popular cryptogamic botany, it is desirable that there should be uniformity in the use of English names of the species and groups. For example, to what group shall we apply the name of the mildews? or the blights?

2. Cannot the botanists do somewhat to bring about greater uniformity in the pronunciation of botanical names and terms? That this is needed requires no further demonstration than that afforded by a single session of the club. We believe that the time is not far distant when botanists must listen to our Latin scholars, and take steps which shall lead to a pronunciation in conformity with what is now regarded as the best Latin usage.

3. The question of the publication of botanical papers (aside from those of systematic interest) may well demand attention. We have several journals devoted to botany alone, and several others maintaining botanical departments. Now, might it not be well to provide for a "division of labor" here, so that each journal might develop its particular branch or department? Moreover, might not the club arrange for a more general distribution of botanical papers (articles) by a general system of exchange?

4. The relations of the botanists of the country to the National Herbarium might be made the subject of discussion and action,

with profit, we apprehend, to the botanists and also to the National Herbarium.—*Charles E. Bessey.*

BOTANICAL NEWS.—The subject of bacteriology received especial attention in the July number of the *Botanical Gazette*, there being no less than a dozen notes and notelets devoted to it, besides four reviews of books upon the same subject.——Clara E. Cummings, of Wellesley, Mass., has prepared a neat catalogue of the Musci and Hepaticæ of North America north of Mexico, which will prove useful to botanists who collect specimens in these classes of plants. The arrangement of the mosses is based upon Lesquereux and James' Manual of Mosses, and that of the liverworts upon Underwood's Catalogue of the North American Hepaticæ. There are enumerated 888 species of mosses and 231 of liverworts, besides many varieties. Copies may be procured of the author for thirty-five cents each.——The Bulletin of the Brookville Society of Natural History, recently issued, contains two articles of botanical interest, viz., The Flora of Franklin county (Indiana), by O. M. Meyncke, and Microscopical Notes, by E. G. Grahn. The former is restricted to the "exogens," and is little more than a bare list, containing but few notes. The second paper contains a list of diatoms and desmids.——A late number of the Bulletin of the Chicago Academy of Sciences contains a readable paper by W. K. Higley on the Northern pitcher plant, or the side-saddle flower (*Sarracenia purpurea* L.). To it are appended several tables of chemical analyses of the fluid contained in the pitchers. It appears that its acidity, which may be very slight at the beginning, increases with the age of the leaf. The acids detected were hydrochloric, sulphuric, carbonic, malic and citric, and respecting these our author says: "To just what acid, if any particular one, the reaction was due in the liquid of the earlier pitchers is not certain, but in the two last months both malic and citric acids appeared, the former in great abundance." As to the origin of the fluid Mr. Higley says: "As a result of the examination of over eight hundred leaves, I find that none contained any fluid before they had opened. These were collected from several localities. After opening there is no fluid till after the first rain, except in a few cases when there has been a heavy dew."——The July *Journal of Botany* contains an interesting review (by Häkel) of Nägeli and Peters' Hieracien Mittel-Europas. The number of species is 164, but the subspecies, varieties and sub-varieties bring up the number of "kindreds" to 2000. In discussing their relationships "it is shown that the kindred forms are of unequal systematic value, and that the species consists partly of individual kindred forms and partly of groups of them."